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STATEMENT OF WORK

REMEDIATION OF CONTAMINATED GROUND WATER AT THE SOLAR PONDS

Prepared by:

Environmental Restoration Division

EG&G, Rocky Flats Plant

July 13, 1990

1.0 OBJECTIVE

The purpose of this task is to provide technical support for the Demonstration, Testing and Evaluation (DT&E) Program at the Rocky Flats Plant.
The specific DT & E objective to be satisfied within this contract is the demonstration of a practical technology to effect significant reductions in radioactivity and organic in the soil near the 903 Pad.

2.0 SCOPE

This Statement of Work (SOW) consists of the identification of viable treatment processes by literature search, bench scale and pilot scale demonstrations.

If bench and pilot test results are encouraging, this project may proceed with approval to a field demonstration. Any field work will be conducted only after receiving approval from EG & G. In the Demonstration Program, technologies are field tested on site media, which may be contaminated with hazardous and/or radioactive materials.

Following is a brief site characterization and description of contaminants present at the site.

2.1 Site characterization

Ground water at the Solar Ponds is well characterized with current, high quality data. Routine samples of the water have been collected for a long period of time and analyzed for gross alpha activity, gross beta activity, pH, and nitrate concentration. Since 1986 more complete hazardous substance list characterization of water has been conducted a number of times. More complete information can be found in the following documents: the annual Ground Water Monitoring Reports; the July 1, 1988 RCRA Closure Plan and the 1990 Solar Ponds RCRA Facility Investigation /Remedial Investigation work plan.

2.2 Contaminants

Ground water collected by the Interceptor Trench Pump House System is typically contaminated by high nitrate concentrations (approximately 500 milligrams per liter(mg/l)), traces of volatile organic compounds (ug/l range), traces of some metals (near drinking water standards), elevated uranium activity levels (approximately 100 pCi/l), and some elevated tritium levels (approximately 1,500 pCi/l).

More complete information can be found in the following documents: the Annual Ground Water Monitoring Reports, the July 1,1988 RCRA Closure Plan and the 1990 Solar Ponds RCRA Facility Investigation/Remediation work plan.

3.0 REQUIREMENTS

All treatment activities shall be performed in the stages described below. Stage I and Stage II must be performed at the contractor's site. Stage III, if required, will be performed at the Rocky Flats Plant.

3.1 STAGE I: BENCH-SCALE TREATABILITY STUDY

3.1.1 Task 1.0 Bench-Scale Work Plan

A Bench-Scale Work Plan (BSWP) shall be developed. The BSWP shall include the following:

- Project Description and Site Background
- Remedial Technology Description
- Test Objectives
- Literature Search
- Specialized Equipment and Materials
- Experimental Procedures
- Treatability Test Plan
- Analytical Methods
- Data Management
- Health and Safety
- Residuals Management

Provide a rationale for the selection of the preferred treatment technology and show the technologies that will be evaluated during this selection based on the literature search.

Conduct an additional literature search in vendor manuals on the removal efficiencies of the contaminants from water.

Specify test materials, equipment, sample size requirements, sample preparation, and quality assurance/quality control procedures (shall be specified for each treatability test).

Include detailed test procedures for evaluating several water treatment technologies.

Present the data analysis methods that will be employed for interpretation of the test results.

The QA/QC Plan incorporated in the Treatability Test Plan shall include data validation and the evaluation procedures.

The Bench-Scale test program shall include provisions EG & G to witness the tests. Notification of not less than ten working days is necessary

Determine the optimal solidification/stabilization process for the waste stream(s) generated by the preferred ground water treatment technology.

Present a procedure for the development of a conceptual process

design for the treatment based on the selection of the technologies for the treatment of ground water.

3.1.2 Task 2.0 Bench-Scale Test

Collect water samples from the existing ground water stations. Prepare samples for use in the bench-scale treatability tests.

Execute the test plan developed in the BSWP.

3.1.3 Task 3.0 Bench-Scale Test Report

A report must be prepared on the results of the Bench-Scale Treatability Study. The report shall include the following information:

- Process Description
- Description of experimental apparatus and procedures
- Detailed description of the experiments and their correlation with each other
- Amount of waste used in each experiment
- Number of samples taken in each test and the size of samples
- Sampling and analytical procedures, including quality assurance (QA) procedures to assure the validity of the result
- Experimental results and statistically valid conclusions, especially regarding the treatability of ground water at the Solar Pond site
- Propose a conceptual flow diagram for the treatment of ground water at the Solar Pond site, including residuals management.

The report shall be submitted to EG & G for review. EG & G and DOE shall review and approve the Stage I report and determine if additional testing should be allowed. Approval to proceed to the next Stage will be based on the following criteria:

- Completeness and statistical validity of the test plan, and
- Treatment results meeting the treatment goals.

The contractor shall not proceed with the Stage II work until written direction to proceed is provided by EG & G.

3.2 STAGE II: PILOT-SCALE TREATABILITY STUDY

The contractor shall conduct a Pilot-Scale treatability study to evaluate the performance and the scale-up potential of the process to treat ground water. This Stage of work will also consist of three tasks similar to Stage I

3 2 1 Task 1.0 Pilot-Scale Work Plan

The Pilot-Scale Work Plan shall be very similar to the Bench-Scale Work Plan. Although many sections are similar there are some differences which should be noted. In addition to the requirements identified in Section 3.1.1 of this SOW, the following shall also be included in the Stage II Work Plan·

- Description of the specific conditions under which the pilot test will be conducted;
- Pilot Plant Operation and Maintenance Procedures;
- Description of the flow sheet for the treatment of ground water at the Solar Pond site;
- Sampling plan (detailed description of the locations and a schedule for samples to be taken from the pilot plant to determine performance; readings from in-line instruments,such as pH probes and sampling methods, containers etc., should be included);
- Health and Safety Plan (equipment design and construction must comply with applicable code requirements); and
- Parameters to be tested shall be identified, listing operational parameters which are fixed as well as variable.

3.2.2 Task 2.0 Pilot-Scale Test

A Pilot-Scale test shall be conducted on a larger volume of water and must demonstrate that the treatment goal can be achieved.

3.2.3 Task 3.0 Pilot-Scale Test Report

A report shall be prepared on the Pilot-Scale Treatability Study.The report shall include the following information:
- A detailed description of the equipment and the procedures used, including the analytical procedures.
- A Flow sheet of the operation.
- Mass balance for the contaminants of concern present in the ground water.
- Complete analytical results, including Quality Assurance/Quality control (QA/QC) methods used with the samples and chemical analyses. The results obtained in sample blanks and duplicates must also be reported.
- A listing of any problems and process interferences encountered during the pilot test and corrective actions taken to remedy the situation(s).
- Conclusions which can be drawn from the pilot - scale test regarding the treatability of the water and recommendations for future actions.
- The report shall address the impact(s) of variability on the treatment operation. Variability of the feedstock, as well as the variability of the treatment system's operational parameters are to be considered.
- A cost estimate for the Pilot-Scale demonstration (Stage III) and full-scale treatment using the proposed treatment process. The basis for the estimate should be clearly stated (the demonstration to be conducted on the Rocky Flats Plant site, using full scale equipment).
- Proposed schedule for the Stage III Pilot - Scale Demonstration
- A discussion of all the technical, regulatory and contractual concerns related to implementation of Stage III and Contractor's plan of action to address them.

The report shall be submitted to EG & G for review. EG & G and DOE

shall review the Stage II report prior to advancing onto the next stage. Approval to proceed to the next Stage will be based on the following criteria:

- Completeness and statistical validity of the test plan, and
- Treatment results meeting the treatment goals.

The contractor shall not proceed with the Stage III work until written direction to proceed is provided by EG & G.

EG & G reserves the right to terminate further work by the Contractor if the Contractor's Stage II performance does not meet treatment goals.

3.3 STAGE III: PILOT-SCALE DEMONSTRATION OF TREATMENT

Stage III Pilot-Scale work, if required, will be conducted with near full scale equipment in the field at the Rocky Flats Plant. Requirements are similar to the Stage II requirements. Stage III will include three tasks: Task 1.0 - Work Plan, Task 2.0 - Demonstration, Task 3.0 - Report on the Demonstration. EG & G reserves all rights to complete the work required for Stage III. If the EG & G requires performance of Stage III work, the Contractor shall be prepared to do this at the Solar Ponds of Rocky Flats Plant and meet the treatment goal(s) above. EG & G reserves the right to eliminate or postpone work on Stage III, regardless of the Contractor's performance on Stage I and II.

Only an expression of interest to do Stage III work needs to be stated in the Contractor's proposal.

4.0 ADDITIONAL REQUIREMENTS

RFP is engaged in the manufacturing of components for nuclear armaments. Consequently, there are operational constrains that a contractor must be aware of. The following list is not exhaustive, but highlights some significant constrains on the contractor's operation.

4.1. Inspections

When the contractor is on site at the Rocky Flats Plant (Plant) the contractor will be subject to inspections for compliance with all security, safety and environmental protection requirements. These inspections may be conducted by any authorized EG&G or DOE representative or subcontractor. In the event that a deficiency is found during the inspection, all contractor actions may be shut-down, at the discretion of the EG&G or DOE representative. The contractor shall correct the deficiency in the shortest possible time, and inform the Plant that corrective action has been implemented. RFP staff shall determine if and when the contractors operations would be allowed to restart. During the duration of this project the contractor must comply with all Plant security, safety and environmental protection requirements. This

requirements apply to both on and off-site. In addition to these requirements the contractor will be subject to the following specific inspections:

- An inspection of the contractor's facility will be conducted within 15 days of subcontract award to ensure that all safety, health physics/radiation monitoring procedures and waste management procedures are in place. In the event that a deficiency is found during the inspection, the contractor shall have ten (10) working days to correct the deficiency and to inform the Plant that corrective action has been implemented.

- In the event that the contractor must construct or take over any facilities as a part of this contract, the engineering drawings and package must be reviewed by EG&G for security, safety and health physics/radiation monitoring procedures and requirements.

- The contractor will be subject to both announced and unannounced inspections for compliance with all applicable regulations and requirements. These inspections may be conducted by the Federal, State or local authorities. These authorities include, but are not limited to, the US Environmental Protection Agency, the Colorado Department of Health, and county health departments.

4.2 Waste Requirements/Transportation

The contractor must minimize, to the extent practicable, the volume of waste and other residues generated from any phase of this project. The contractor will provide the Plant with a plan for the management of all wastes and contaminated materials as a part of the proposal.

The contractor must state the quantity of each type of waste expected to be generated from any phase of this project. All unused waste, contaminated materials or generated waste from any phase of this project shall be shipped back to the Plant prior to the commencement of waste generation on the subsequent phase of the project.

The contractor shall be responsible for arranging transportation of all waste movement related to this project to and from the Plant and while on the Plant. Arrangements are to be coordinated through the Plant's Trucking Department. A special licensed waste hauler shall be used to transport the waste, and this carrier must be identified. The contractor shall be responsible for complying with the Federal, State, and local regulations for the transport of any material to and from the Plant. At a minimum, 49 CFR, parts 100-177 (Transportation of Hazardous Materials), 40 CFR (Protection of the Environment) and section 121(d)(3) of CERCLA will apply to these shipments. The contractor shall make timely applications and

requests for all required permits and approvals related to waste shipping. The contractor shall also comply with all packaging, marking, labeling, and placarding requirements of the regulations or the Plant.

The contractor shall provide vehicles for the transport of waste to and from the Plant. Vehicles and drivers thereof shall meet all requirements as promulgated by the Federal Motor Carrier Safety Regulations (49 CFR, Parts 383, 390-399).

4.3 Security

The contractor shall be responsible for compliance with all security requirements of the Plant. These requirements include, but are not limited to, the following:

- Certain areas of the Plant are accessible only to personnel holding a DOE "Q" clearance. Access to some of these areas by non-Q cleared personnel is possible, but arrangements must be made a minimum of 72 hours in advance. The contractor is responsible for all such arrangements and obtaining the required signatures.

- All notes and correspondence created by the contractor while at the Plant must be reviewed for classification purposes by an authorized classifier prior to the removal of those notes from the Plant. The contractor is responsible for all such arrangements. The notes and correspondence that must be reviewed include field notes or meeting minutes regardless of area, purpose or content.

- Photography equipment is prohibited at the Plant. The contractor must arrange for any necessary or required photographs at the Plant through the Plant Photography Department. The contractor is responsible for all arrangements and obtaining any required signatures for photography work.

4.4 Permits

The contractor shall be required to identify and obtain all permits required for any project activities, whether on or off-Plant. Upon request, the contractor shall provide EG&G or DOE with copies of all such permit applications and related documents.

4.5 Inter-Agency Agreement

The contractor is responsible for compliance with all pertinent sections of the Inter-Agency Agreement (IAG) that governs environmental and waste-related matters at the Plant. This IAG is currently available in a draft form, but is undergoing re-negotiation. Additionally, the contractor is responsible for compliance with all requirements documents that have been prepared

in response to the IAG requirements. These documents include, but are not limited to Health and Safety Requirements, Standard Operating Procedures, Quality Assurance/Quality Control Documents, and the Plan for the Prevention of Contaminant Dispersal.

4.6 National Environmental Policy Act Documentation

The contractor will be required to comply with all National Environmental Policy Act (NEPA) requirements that may pertain to this project. The contractor shall keep the NEPA division of EG&G informed of all activities and progress. The contractor shall comply with any requirements that are pertinent as identified by EG&G. These requirements may include a public comment and response period on certain project actions. NEPA requirements may impact schedule and performance of work.

4.7 Training

The contractor is responsible for ensuring that all personnel involved in this project are adequately trained for the actions they are to take as a part of this project. In particular, the requirements of the IAG, the Health and Safety Documents prepared for compliance with the IAG, and the Occupational Safety and Health Administration (OSHA) requirements for training to investigate hazardous waste sites will be pertinent and must be reviewed by the contractor.

4.8 Liability

The contractor will be responsible for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Plant. This liability will be limited to those above named materials generated, stored, treated, handled, transported, released or disposed that are directly related to this project.

5.0 SEQUENCES AND RELATIONSHIP TO OTHER TASKS

The attached flow chart identifies inter-relationships between the stages, tasks, and sequent actions.

6.0 PROPOSED SCHEDULE FOR DELIVERABLES

Following is Proposed Schedule (in weeks from contract award date):

* Contractor completes Stage I	Task 1.0	4 weeks
* Waste for Stage I is shipped to the Contractor		12 weeks
	Task 2.0	20 weeks

Task 3.0 24 weeks

* EG & G, DOE evaluates Stage I results; determines whether Contractor shall be authorized to proceed with Stage II 28 weeks

* Contractor completes Stage II
Task 1.0 40 weeks

* Waste for Stage II is shipped to the Contractor 48 weeks

Task 2.0 56 weeks
Task 3.0 60 weeks

* EG & G, DOE evaluates Stage II results; determines whether Contractor shall be authorized to proceed with Stage III 64 weeks

* Stage III will proceed based upon authorization and IAG requirements. The schedule cannot be predicted now.

Each Treatability Work Plan will be reviewed by EG & G at the 30% and 95% complete stages. Comments on the Draft Plan will be formally documented and submitted to the contractor for the incorporation of comments.

7.0 MANAGEMENT AND CONTROL

The contractor shall provide a cost/schedule performance report by the fifteenth and last working day of each month for the previous two weeks to the EG & G project manager. The report of the fifteenth will supply the actual costs of the previous month, the report of the last day of the month will provide estimated costs for the two week reporting period. This report will contain the following information for each cost account assigned to the contract:

Current Reporting Period

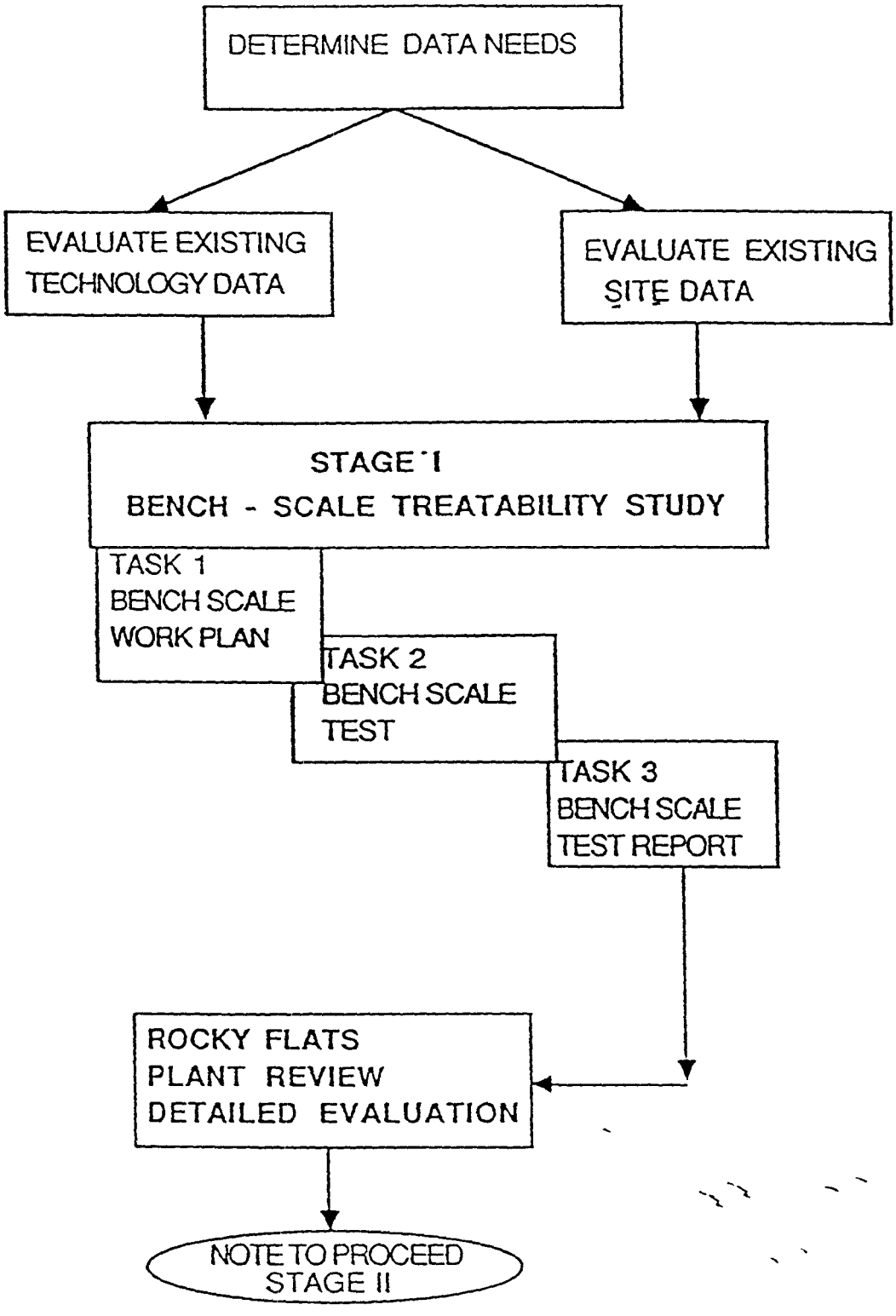
BCWS - Budgeted Cost Of The Work Scheduled
BCWP - -Budgeted Cost Of The Work Scheduled
ACWP - Actual Cost Of The Work Performed

Year To Date
BCWS - Budgeted Cost Of The Work Scheduled
BCWP - Budgeted Cost Of The Work Scheduled
ACWP - Actual Cost Of The Work Performed

The progress report will also provide detail on the progress for the current two week reporting period as well as identify work to be performed over the next two weeks. Problems/issues that have arisen or are anticipated to arise should be detailed in these reports. However, should a problem arise, the subcontractor must

contact the EG & G project manager immediately. The specific format required for each performance report will be distributed upon award of contract.

5.0 SEQUENCES AND RELATIONSHIPS TO OTHER TASKS



5.0 SEQUENCES AND RELATIONSHIPS TO OTHER TASKS

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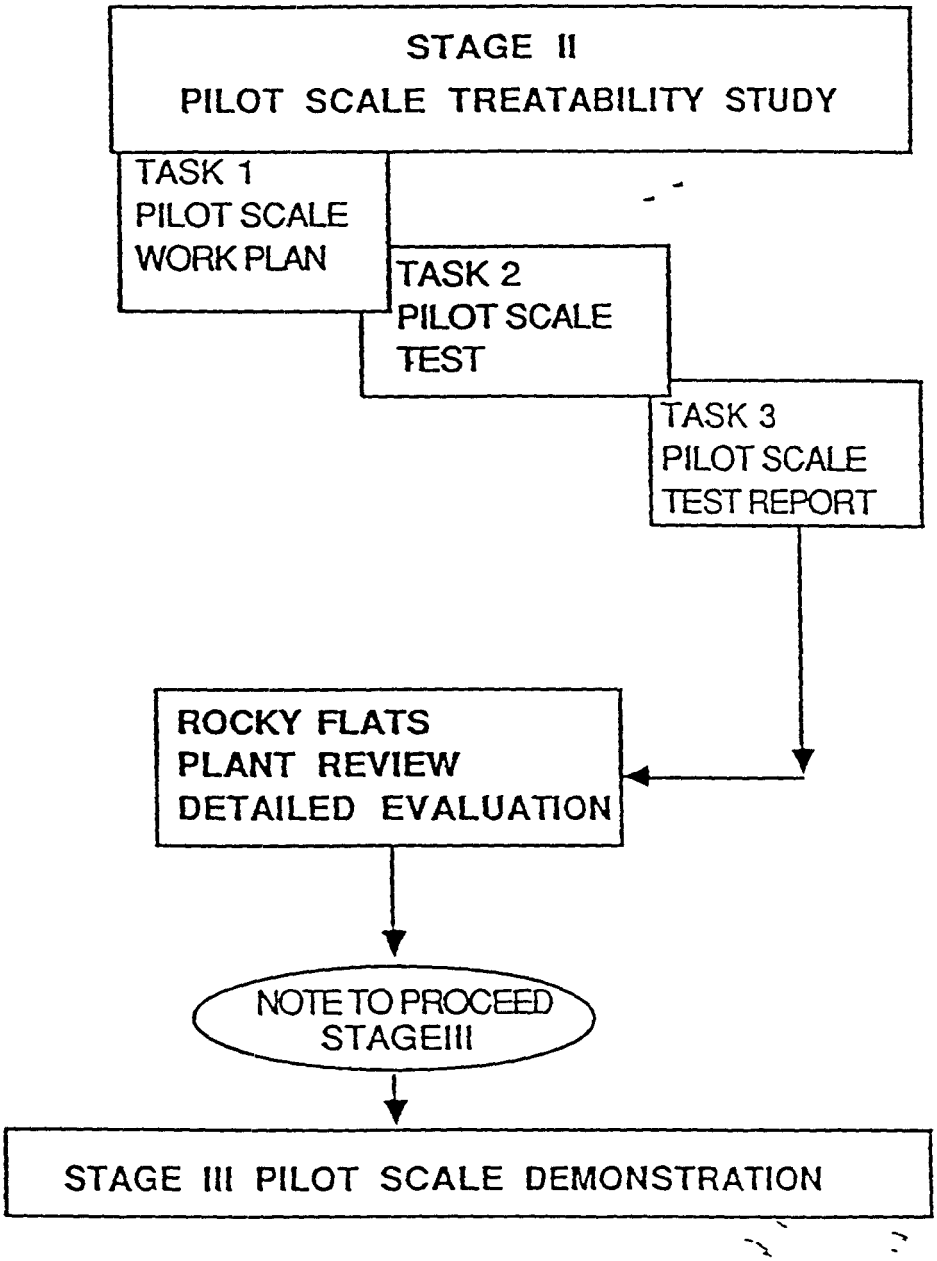

PROPOSED SCHEDULE DELIVERABLES

TASK	# OF WEEKS FROM CONTRACT AWARD	NUMBER OF MONTHS FROM CONTRACT AWARD (1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16)
CONTRACT AWARD	START	|
STAGE I, BENCH SCALE TREATABILITY STUDY	24	XXXXXXXXXXXXXXXXXXXXXXX
TASK 1 0 BENCH-SCALE WORK PLAN	4	XXXX
WASTE FOR STAGE I SHIPMENT	12	XXXXXXXX
TASK 2 0 BENCH SCALE TEST WORK	20	XXXXXXXX
TASK 3 0 BENCH-SCALE TEST REPORT	24	XXXX
EG & G/DOE DETAILED EVALUATION	28	XXXX
STAGE II PILOT-SCALE TREATABILITY STUDY		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
TASK 1.0 PILOT-SCALE WORK PLAN	40	XXXXXXXXXXXX
WASTE FOR STAGE II SHIPMENT	48	XXXXXXXX
TASK 2 0 PILOT SCALE TEST WORK	56	XXXXXXXX
TASK 3 0 PILOT SCALE TEST REPORT	60	XXXX
EG & G/DOE DETAILED EVALUATION	64	XXXX
STAGE III PILOT SCALE DEMONSTRATION	TO BE DETERMINED LATER (proceed upon athorization)	